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MOTOPLUS APPLICATION INSTALLATION INSTRUCTIONS

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
CONTROLLER INSTRUCTIONS
CONTROLLER OPERATOR'S MANUAL
CONTROLLER MAINTENANCE MANUAL

The Controller Operator's manual above corresponds to specific usage.
Be sure to use the appropriate manual.

Part Number: 166687-1CD
Revision: 0



MANDATORY

- This manual explains MotoPlus Application of the controller system. Read this manual carefully and be sure to understand its contents before handling the controller.
- General items related to safety are listed in the Chapter 1: Safety of the controller Instructions. To ensure correct and safe operation, carefully read the Controller Instructions before reading this manual.



CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the controller.

In this manual, the Notes for Safe Operation are classified as “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.



MANDATORY

Always be sure to follow explicitly the items listed under this heading.



PROHIBITED

Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.



To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “CAUTION” and “WARNING”.



CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
 - Check for problems in manipulator movement.
 - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the controller cabinet after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of the Warning Labels in the Controller Instructions before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.


MotoPlus is an abbreviation of **M**otoman **P**rofessional **P**rogramming **L**anguage for **S**uperior Use.

The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and manipulator cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
Controller	DX
Programming Pendant	Programming Pendant

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys	The keys which have characters printed on them are denoted with []. ex. [ENTER]
	Symbol Keys	The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. page key  The cursor key is an exception, and a picture is not shown.
	Axis Keys Numeric Keys	"Axis Keys" and "Numeric Keys" are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a "+" sign between them, ex. [SHIFT]+[COORD]
	Displays	The menu displayed in the programming pendant is denoted with { }. ex. {JOB}

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select •••" means that the cursor is moved to the object item and the SELECT key is pressed.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.

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1 Outline

1.1 Introduction

This manual explains the procedure to install a MotoPlus application on a Motoman controller. MotoPlus applications are customer specific applications that operate on the main CPU board [YCP01 board (DX100) or CPU201R board (FS100)] of the controller. Users can run a variety of application programs on their own without modifying the source code of the robot controller.

2 Installation and Start-up of Application Program

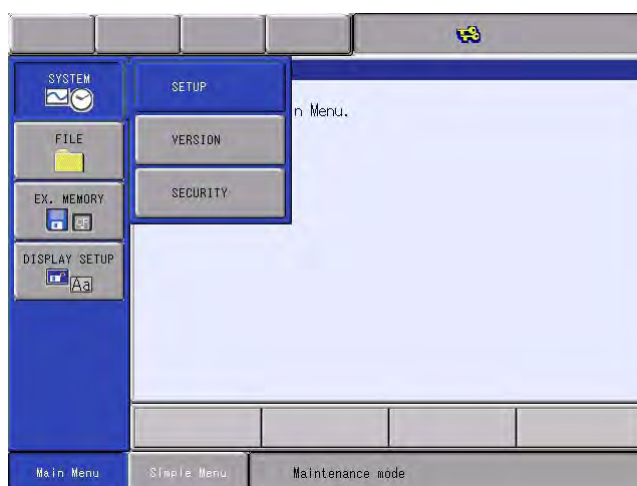
2.1 Installation of MotoPlus Application in Maintenance Mode

1. Access the MotoPlus Menu in Maintenance Mode

- (1) Turn ON the power while pressing [MAIN MENU] simultaneously.
 - If the power is turned ON while pressing [MAIN MENU] simultaneously, the maintenance mode starts up.



- (2) Select {SYSTEM} under the main menu.
 - {SETUP}, {VERSION}, and {SECURITY} appears.



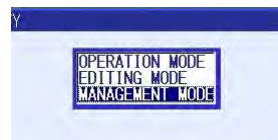
(3) Select {SECURITY}.

– The selection window of security mode appears.



(4) Press [SELECT].

– {OPERATION MODE}, {EDITING MODE} and {MANAGEMENT MODE} appears.



(5) Move the cursor to {MANAGEMENT MODE}, and Select.

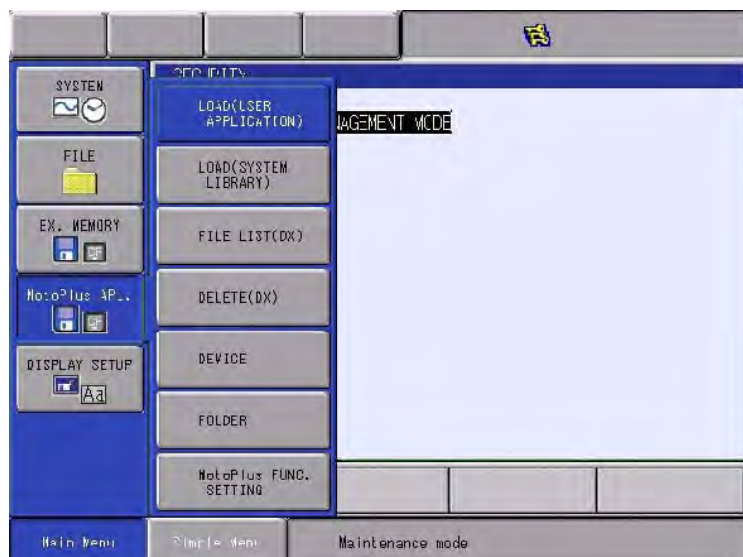
– Ready to enter the password.



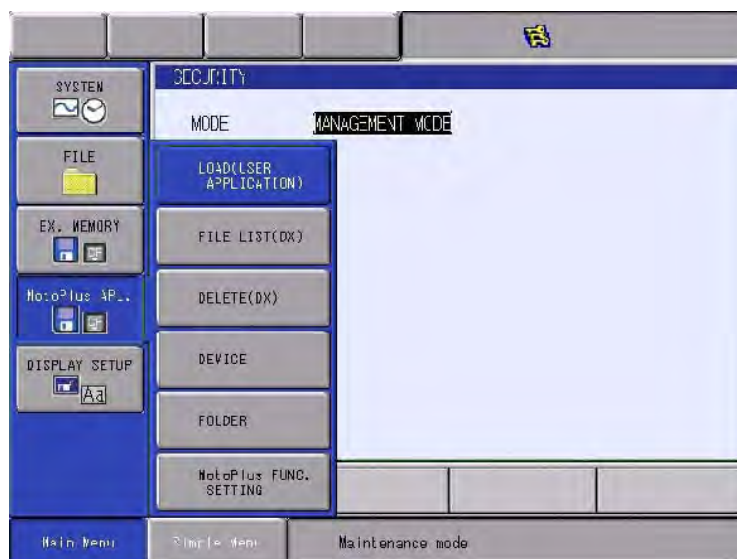
(6) Enter the {MANAGEMENT MODE} password (default is 99999999) and press [ENTER]

(7) Select {MotoPlus APL} under the main menu.

– DX100 system software version earlier than DS3.20-14 window:



- DX100 system software version DS3.20-14 or higher window and all FS100 system software.

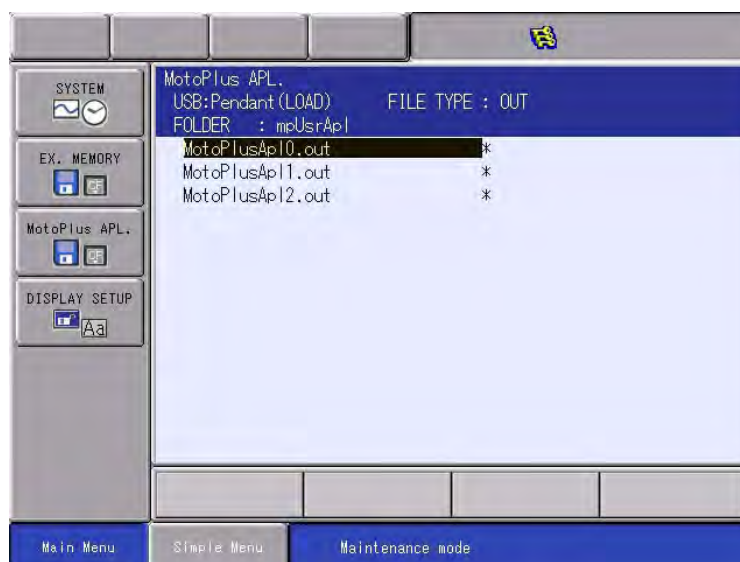


2. Specify the file location.

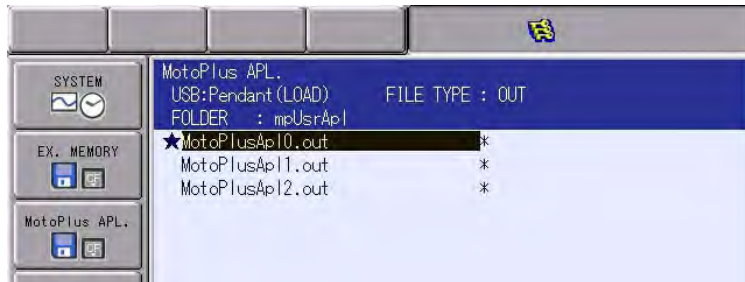
- (1) Select the desired file location by selecting the device and folder.
 - Select the submenu {Device} to choose the device.
 - Select the submenu {Folder} to choose the desired folder on the current device.

3. Load and Install Application

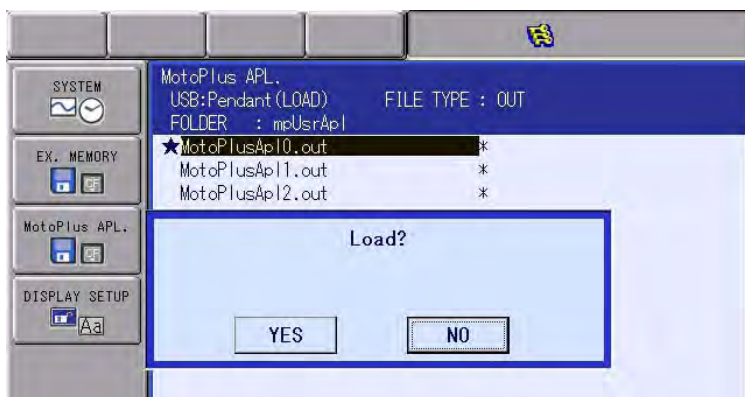
- (1) Select the submenu {LOAD (USER APPLICATION)}. Then, "*.out" files in the specified folder appear as shown below.



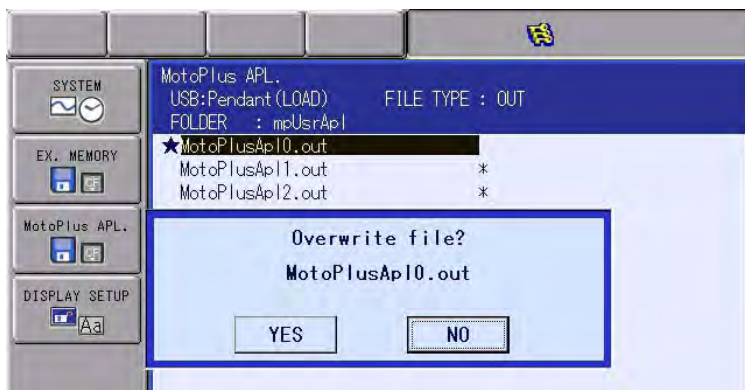
- (2) Move the cursor and press [SELECT]. Then, the selection indicator “★” appears on the left of the application file name. Press [SELECT] again to clear “★”.



- (3) Press [ENTER], then the following confirmation dialog box appears.

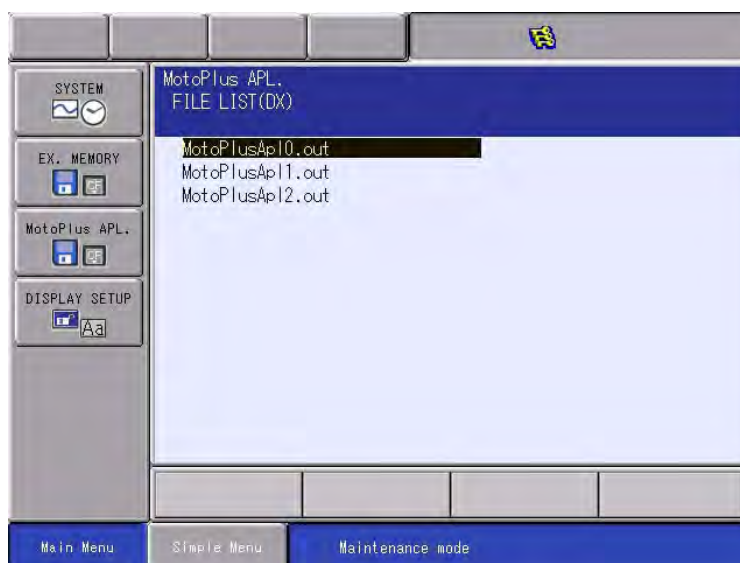


- (4) When {YES} is selected and the selected application file already exists in the controller, the following confirmation dialog box appears. Select “YES” to load.



2.2 List of Installed MotoPlus Applications

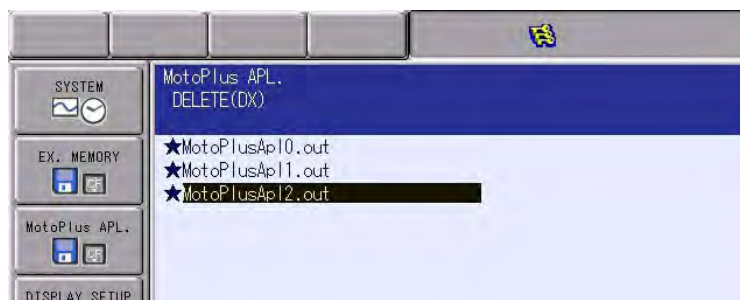
Select the submenu {FILE LIST (DX)}. Then, the list of the application files which already exist in the Controller appears.



2.3 Deletion of MotoPlus Application

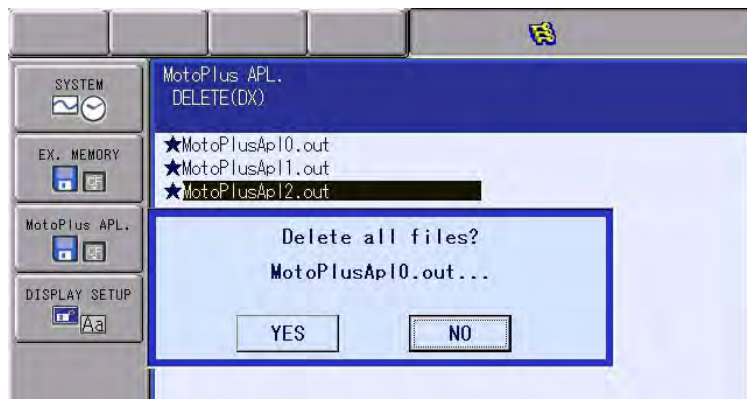
By the submenu {DELETE (DX)}, the application file which already exists in the Controller can be deleted.

1. Move the cursor and press [SELECT] and observe the selection indicator “★” appears on the left of the application file name.



Pressing [SELECT] again clears the “★” indicator.

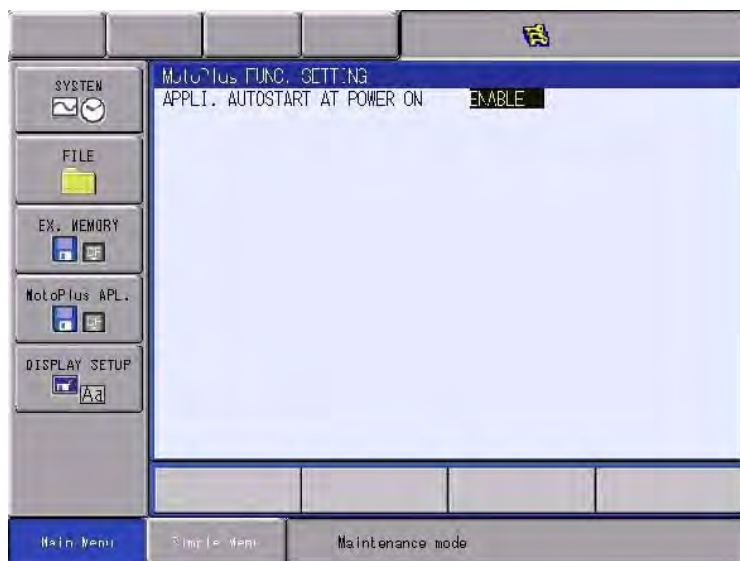
2. Press [ENTER], then the following confirmation dialog box appears.



2.4 MotoPlus Function Setting

When selecting “MotoPlus FUNC. SETTING”, the following windows appear to enable or disable the autostart of the MotoPlus application program. For the detailed usage methods, refer to *Section 2.5 “Start-up of Application Program” on page 2-7* and *Section 2.6 “To Temporarily Prevent MotoPlus Application from Starting” on page 2-8*.

1. Move the cursor and press [SELECT]. The setting is changed from “ENABLE” to “DISABLE”.

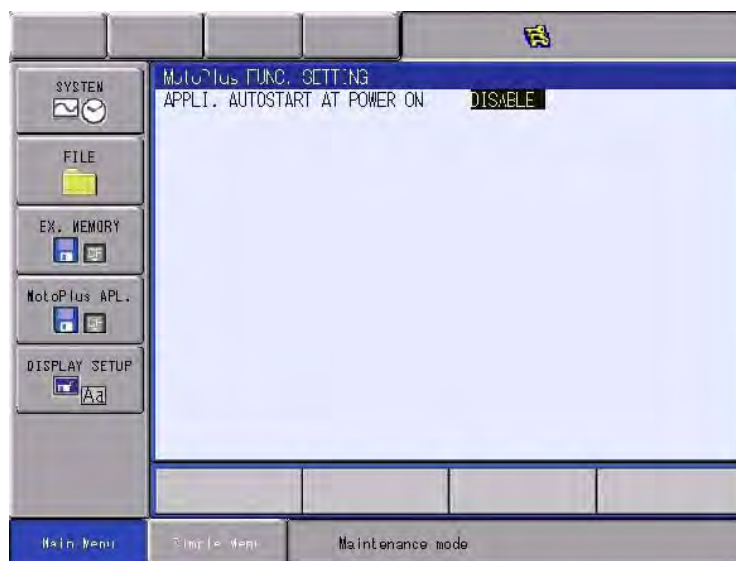


2. Press [ENTER], and then the confirmation dialog box appears.



3. Select {YES}.

–When {YES} is selected on the confirmation dialog box, the parameter is set automatically, and then it returns to the MotoPlus setting window.



2.5 Start-up of Application Program

When the Controller is turned ON, the application program is loaded automatically and started.

2.6 To Temporarily Prevent MotoPlus Application from Starting

In some circumstances with a MotoPlus of the application, the system may hang up during robot operation, and then the Controller may not start normally. For recovery, it is necessary to start the Controller normally while preventing the MotoPlus application from operating. In such case, it is necessary to start the Controller in MAINTENANCE mode, change the settings so that the MotoPlus application does not operate, start the Controller normally, and operate the robot. Follow one of the following two procedures:

1. Delete the MotoPlus application using *Section 2.3 "Deletion of MotoPlus Application" on page 2-5*.



After a specific condition is cleared, the MotoPlus application must be loaded again using *Section 2.1 "Installation of MotoPlus Application in Maintenance Mode" on page 2-1*.

2. Disable the MotoPlus application autostart using *Section 2.4 "MotoPlus Function Setting" on page 2-6* to set the "APPLI. AUTOSTART AT POWER ON" setting to "DISABLE".



After a specific condition is cleared, the MotoPlus application must be re-enabled again using *Section 2.4 "MotoPlus Function Setting" on page 2-6*.

3 Debugging

3.1 Debugging Environment

Some MotoPlus applications contain debugging statements for viewing in debugging environment.

For the debugging environment, connect the PC for development with the RUN-TIME debugger of the controller OS (VxWorks) via Telnet.



With the Telnet function, the processing time for the robot operation control is consumed, and a system alarm may occur because insufficient processing time.

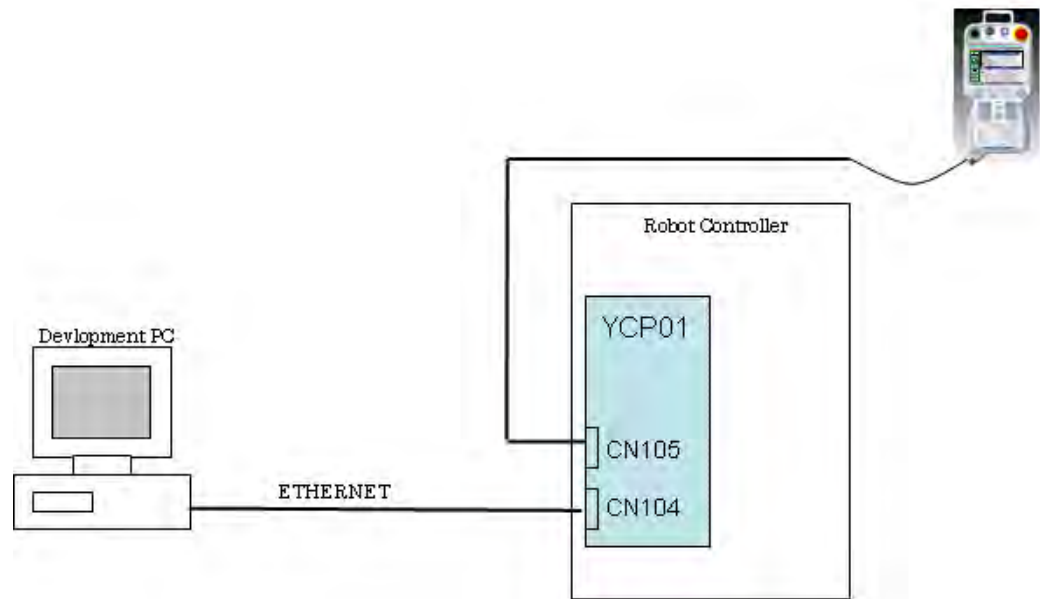
3.2 Connecting Controller with PC

Connect the PC for development with the Controller to debug programs via Telnet.

3.2.1 DX100 Connections

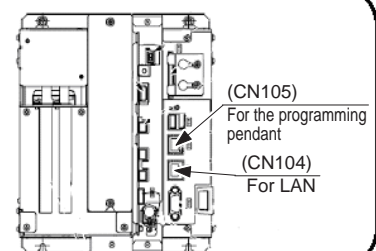
Connect an Ethernet cable (shielded twisted-pair, CAT 5 or greater) to the LAN connector CN104 (RJ-45) that mounts on the front of the YCP01 board in the CPU rack of the controller.

Fig. 3-1: DX100 Controller Connection using YCP01 Board



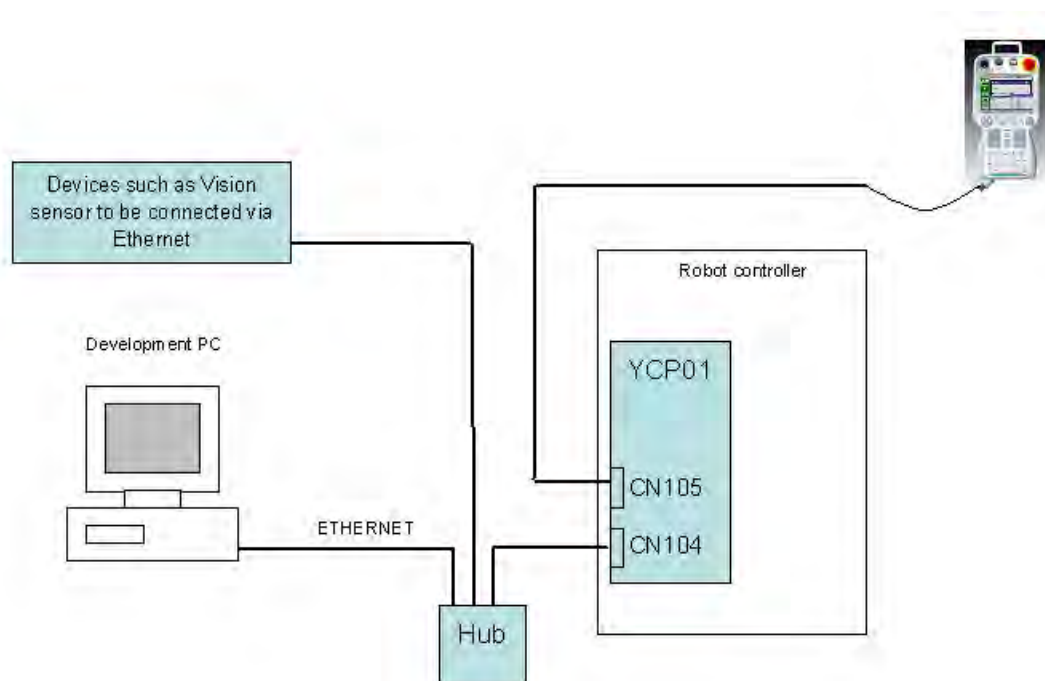
Two RJ-45 connectors mount on the front of the YCP01 board. The CN104, located in the lower position, is for the Ethernet function that MotoPlus supports.

NOTE



To use the Ethernet service provided by MotoPlus, use a commercially available hub and set up the connection as shown below.

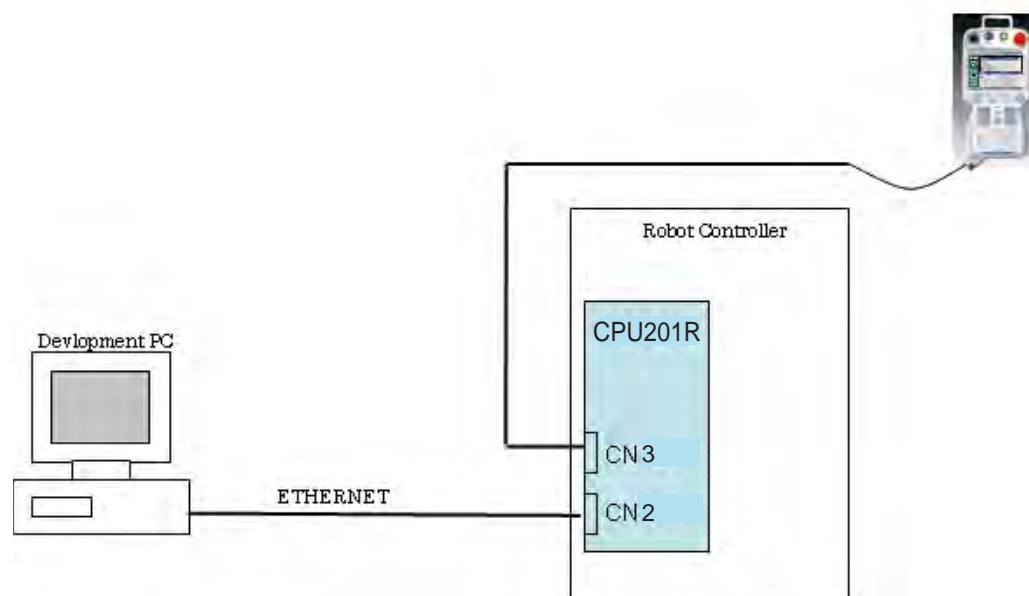
Fig. 3-2: DX100 Controller Connection using a Hub



3.2.2 FS100 Connections

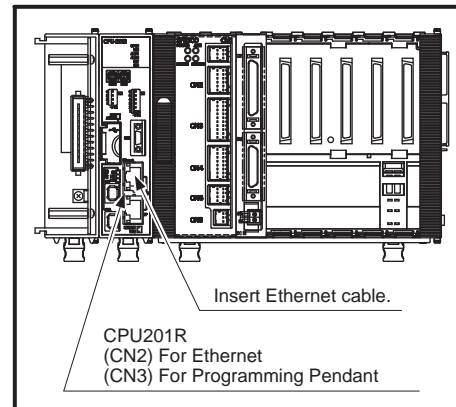
Connect an Ethernet cable (shielded twisted-pair, CAT 5 or greater) to the LAN connector CN2 (RJ-45) that mounts on the front of the CPU201R board in the CPU rack of the controller.

Fig. 3-3: FS100 Controller Connection using CPU201R Board



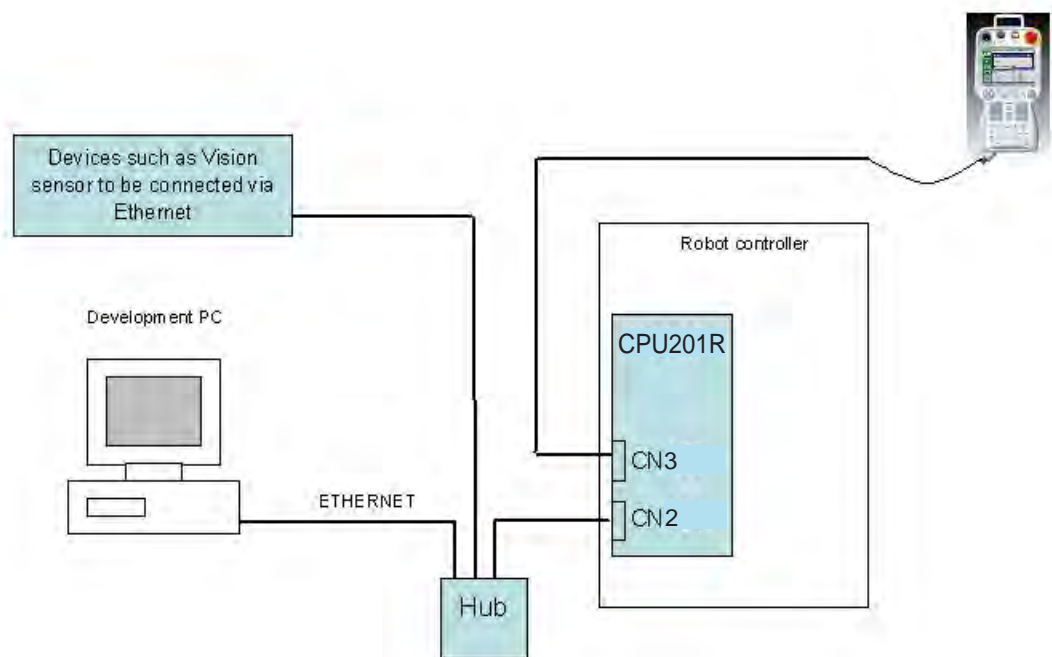
Two RJ-45 connectors mount on the front of the CPU201R board. The CN2, located in the lower position, is for the Ethernet function that MotoPlus supports.

NOTE



To use the Ethernet service provided by MotoPlus, use a commercially available hub and set up the connection as shown below.

Fig. 3-4: FS100 Controller Connection using a Hub



3.3 Debugging via Telnet Communication

The RUN-TIME debugger for the Controller system software can connect to a debug PC via Telnet to provide the user with various types of debugging function. Thus, `printf()` and `puts()` functions can be inserted in the application source code, and the desired memory content or message can be shown on the Telnet terminal.

Telnet functionality can be enabled by setting robot parameter S2C1119 = 2. See details below.



If the Telnet function is enabled, an alarm such as “0500: SEGMENT PROC NOT READY” may occur when the Controller is started.

This is because the Telnet task of the Controller side is performed with a high priority, so processing of other system tasks are not performed normally.

If such an alarm occurs, restart the Controller.

Also, after completing debugging, make sure to set the Telnet function to INVALID (S2C1119 = 0).

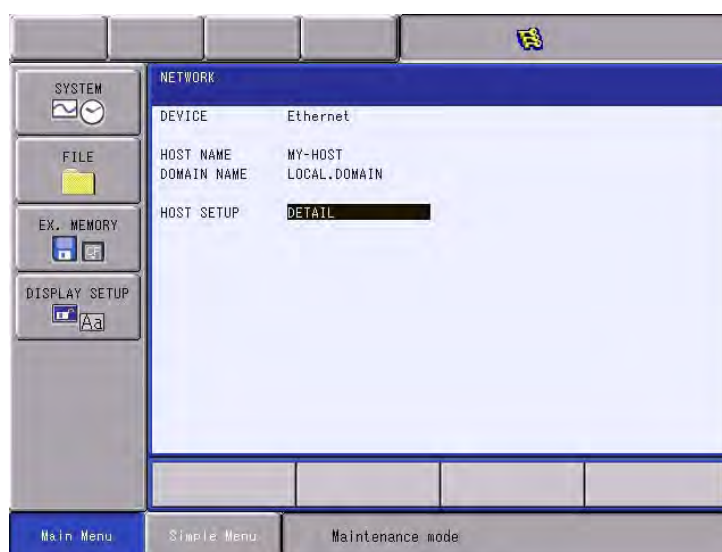
3.3.1 Operation Procedure

1. Set the IP address, etc.

The Ethernet communication settings corresponding to your environment (such as the IP address setting at the Controller side) must be performed in the maintenance mode.

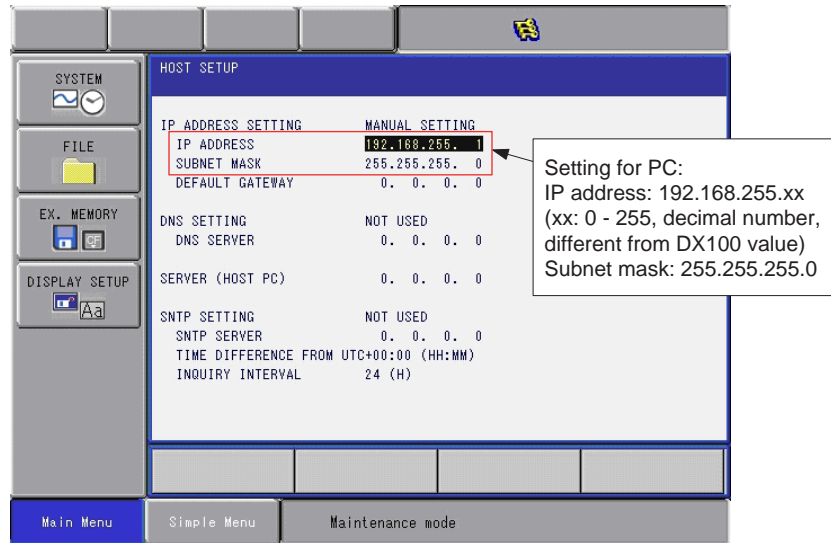
The procedure is as follows:

- (1) Turn OFF the Controller then back ON while pressing the [MAIN MENU] to start the maintenance mode.
- (2) Select {SYSTEM} under the main menu, then select {SECURITY}. Then, change the security mode to the MANAGEMENT MODE.
- (3) Select {SYSTEM} under the main menu, then select {SETUP}. In the setup window, select {OPTION} to open {NETWORK}. In the NETWORK window, select “DETAIL” for “HOST SETUP”.



- (4) Setup the IP address in HOST SETUP window.

Ensure the PC IP address is on the same subnet as the Controller.



2. Restrictions on the IP address setting:

On the DX100 the Ethernet function on the Controller does not support “10.0.0.xx” in the local IP address (xx: 0-255, decimal number). Thus, DO NOT use “10.0.0.xx” for the IP address. However, this range is valid on the FS100 controller.

3. On the PC, set a fixed IP address different from the controller IP address but on the same subnet. For example, if the controller is on IP address 192.168.255.1, set the IP address of the PC to 192.168.255.9. Note: The procedure below uses the values of the example. Substitute the values for the actual IP address of your system.
4. Set the fixed IP address (192.168.255.9) as the network setting of the PC side.
 (“192.168.255.” is the same as the Controller setting.)
- (1) Select Control Panel and then double-click “Network connections”.
 - (2) Double-click “Local Area Connection”.
 - (3) Open the “General” window and select Internet protocol (TCP/IP), then click “Properties”.
 - (4) Check “Use the following IP address”.
 - (5) Enter “192.168.255.9” for the IP address.
 - (6) Enter “255.255.255.0” for the subnet mask.
5. Set the following parameter to enable the Telnet function.
 (S2C1119 = 2)



After completing debugging, set the Telnet function to INVALID (S2C1119 = 0). This is because the Telnet function consumes the system processing time, and an alarm may occur due to insufficient processing time for robot operation.

3 Debugging

3.3 Debugging via Telnet Communication

6. Reboot the Controller.
7. On the PC, select “Accessories”, then “Command Prompt” to open the DOS window.
8. Input the following commands for the command line:
c:\> TELNET 192.168.255.1
 - DX100:
 - VxWorks login: Net_Maint_Mng
 - Password: 99999999



The DX100 password is the MANAGEMENT MODE password.

- FS100:
 - VxWorks login: MOTOMANrobot
 - Password: MOTOMANrobot

Observe the prompt “->” displays and the RUN-TIME debugger of the controller OS starts.

4 Alarm List

Alarm Number	Alarm Name	Subcode	Meaning
1020	MOTOPLUS APPLICATION LOAD ERROR	1	The number of loaded files exceeds the limit.
		2	The memory is insufficient. (Available memory area is less than 3 Mbyte.)
		3	Failed to open the directory.
		4	Load failure (Failed to open the file.)
		5	Load failure (Undefined symbol)
		6	Load failure (Others: application overloaded)
		7	Failed to initialize the API library.
		8	No user root task
		9	Failed to create the user root task.
		10	Failed to create RAM-Disk.
4478	MM TASK NO RESPONSE (MotoPlus)		The process requested from the MotoPlus application to the MM task was not completed within the specified time.
4479	MOTOPLUS MM TASK WATCHDOG ERROR		The man-machine task does not run for 3 seconds or more.

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Specifications are subject to change without notice
for ongoing product modifications and improvements.